slow advance of high No. I on the Atlantic Coast. After this storm was fairly well organized it advanced with great rapidity and disappeared off Nova Scotia on the morning of the 10th. The aforementioned trough continued to advance broadside forward giving heavy rains over a vast region and did not leave its final trace on the coast till the morning of the 13th, when it deposited 1.74 inch of rain at Hatteras in twenty-four hours. A wind of 56 miles per hour was reported at Hatteras on the evening of the 12th.

V.—This storm originated in Kansas on the morning of the 13th, though twelve hours before there had been rain in northern Texas and Kansas. It moved very rapidly in a northeast direction and disappeared to the north of Lake Superior the evening of the 14th; lowest pressure, 29.72, at Port Arthur the morning of the 14th.

VI.—This storm originated to the north of Montana on the morning of the 16th with a pressure of 29.56 at Battleford. Its motion was very rapid toward the east tending south and it disappeared in the Gulf of St. Lawrence the evening of the 18th; lowest pressure, 29.34, at Port Arthur the morning of the 17th. It was characterized by very slight rainfall during its progress and by rather moderate winds for the barometric gradients noted.

VII.—While No. VI was passing eastward a long trough was noted stretching toward the southwest to Texas. This trough was without precipitation, however, except at the extreme northeast end. On the evening of the 18th No. VII was first noted as a sort of condensation in this trough over Missouri. This storm also moved northeast with great rapidity and disappeared over Newfoundland the evening of the 21st. As it approached the coast its conditions became very much intensified, a pressure of 28.74 being noted at Chatham the morning of the 21st. Here, as in a previous case, the wind velocity, 47 miles at Block Island, was entirely incommensurate with the barometric gradients noted.

VIII.—This storm was a concentration of the conditions forming a trough stretching from Arkansas to the Pacific Coast. It first took shape in Arkansas on the morning of the 22d. Its motion was very rapid in a northeasterly direction to the St. Lawrence Valley, where it disappeared the afternoon of the 23d; rains accompanying were generally light; the heaviest was 1.48 of an inch in twenty-four hours at Cairo on the 23d; lowest pressure, 29.86, at Fort Smith on the morning of the 22d.

IX.—The trough from VIII stretched to the west Gulf, and there this (the only Gulf storm of the month) was energized or concentrated on the morning of the 24th, with a pressure of 30.02 at Galveston. This was by far the severest storm of the month, and was regarded as of sufficient importance to call for a Special Bulletin (No. 2 of 1895).

The following quotations are made from this Bulletin:

The morning map of the 25th showed an extended trough of low pressure covering the lower Mississippi and Ohio valleys, with the center near Vicksburg, 29.68 inches. Storm signals were ordered for the lower Lakes and information signals on the upper Lakes, giving notice of this storm twenty-four and thirty-two hours in advance of dangerous gales.

The storm moved to the east of north at 33 miles per hour between the morning and evening reports of the 25th, causing heavy rains in the lower Ohio and Mississippi valleys, and heavy snows in the states north of the Ohio River. It was central at Louisville on the evening of the 25th. Considerable damage from high winds occurred in the Ohio Valley and Tennessee, but the storm did not reach its maximum intensity till the night of the 25th, when it passed from the Ohio Valley to the north of Lake Huron, moving at 75 miles per hour between 8 p. m. of the 25th and 8 a. m. of the 26th. This was one of the severest storms in the lower Lake region. Mean velocities were, at Detroit, 76, Cleveland, 72, and Erie, 60 miles per hour, and at Buffalo that night 68 miles per hour. The storm was followed by a cold wave throughout the lower Mississippi Valley on the morning of the 26th, which extended eastward to the Atlantic Coast on the morning of the 27th, causing freezing temperatures as far south as the central portions of the Gulf States, and frosts along the east Gulf Coast and in northern Florida.

Warnings for high winds and cold waves were fully sent out in the case of this storm.

X.—This storm seems to have originated very near the north Pacific Coast on the evening of the 26th. Its motion was generally eastward with a slight bend to the southward as it crossed the Mississippi Valley, reaching the Gulf of St. Lawrence on the morning of the 30th. The storm had but slight intensity and the precipitation was slight. Lowest pressure, 29.50, at Spences Bridge on the morning of the 27th. A disturbed region existed in the extreme northwest on the last days of the month, but the path of the storm was not definite enough to be charted.

LOCAL STORMS.

By A. J. HENRY, Chief of Division of Records and Meteorological Data.

The term "local" storm has been used in this chapter as applying to the phenomena of thunderstorms and wind gusts of more than usual severity. These may occur, in isolated cases, in groups, or they may be general over one or more States, but as a rule they die out with nightfall. The typical local storm is particularly a phenomenon of the warmer months of the year, and is rarely observed in its full development in winter. The caption "local" storm, is therefore not so appropriate as might be desired for the matter appearing herein during the colder months of the year.

The early part of the month was singularly free from storms of any description; on the 14th and 15th, however, considerable havoc was wrought on the Long Island and New Jersey coasts by high northeasterly gales and the heavy breakers accompanying a slight depression that passed along the coast on those dates. The damage to bulkheads, jetties and piers, was estimated to be very great.

The weather conditions on Sunday the 24th were unsettled. Rain was falling from the Mississippi Valley to the Gulf of St. Lawrence, and snow in western Nebraska, Kansas, and northern Texas. Rain was also falling on the Gulf Coast, but a definite storm center was not yet visible on the daily weather maps. The latter appeared, however, twenty-four hours later, and moved to the Great Lakes as a severe storm of wind, rain, snow, and sleet, whose boundaries extended from the eastern slope of the Rocky Mountains to the Atlantic Seaboard. Telegraphic and telephonic communication and railway traffic were interrupted in all sections covered by the storm. The wind in places reached a very high velocity and caused immense damage. In the oil fields of western Ohio alone the loss was estimated to have been $300,000. The storm was most severe in the central valleys and passed over the Lakes and beyond our boundaries on the 26th.

TEMPERATURE OF THE AIR.

[In degrees Fahrenheit.]

The mean temperature is given for each station in Table II, for voluntary observers. Both the mean temperatures and the departures from the normal are given in Table I for the regular stations of the Weather Bureau.

The *monthly mean temperature* published in Table I, for the regular stations of the Weather Bureau, is the simple mean of all the daily maxima and minima; for voluntary stations a variety of methods of computation is necessarily allowed, as shown by the notes appended to Table II.

The *regular diurnal period* in temperature is shown by the hourly means given in Table IV for 29 stations selected out of 82 that maintain continuous thermograph records.

The *distribution* of the monthly mean temperature of the air over the United States and Canada is shown by the dotted isotherms on Chart II; the lines are drawn over the high irregular surface of the Rocky Mountain Plateau, although the temperatures have not been reduced to sea level, and the isotherms, therefore, relate to the average surface of the

country occupied by our observers; such isotherms are controlled largely by the local topography, and should be drawn and studied in connection with a contour map.

The *highest mean* temperatures were: Key West, 74.8; Jupiter, 72.0; Titusville, 70.0. The *lowest mean* temperatures were: In the United States, St. Vincent and Williston, 20.0; Bismarck, 22.2; and in Canada, Prince Albert, 14.0; Minnedosa, 14.4; Qu'Appelle, 16.2; Winnipeg, 16.8.

As *compared with the normal* for October the mean temperature of the current month was in excess in the Middle States and New England, but elsewhere generally deficient.

The greatest excesses were: New Brunswick, 3.2; Vineyard Haven, 3.0; Boston, 2.7; Nantucket, 2.6; Eastport, 2.4. The greatest deficits were: Williston, 7.9; Bismarck, 6.7; Rapid City, 4.0; Pierre, 3.4; Abilene, 3.3.

Considered by districts the mean temperatures for the current month show departures from the normal as given in Table I. The greatest positive departure was: New England, 2.1. The greatest negative departures were: North Dakota, 4.8; Abilene (southern Slope), 3.3.

The years of highest and lowest mean temperatures for November are shown in Table I of the REVIEW for November, 1894. The mean temperature for the current month was the highest on record at: Eastport, 39.8; Boston, 45.4; Nantucket, 47.2; Vineyard Haven, 48.8; Harrisburg, 44.0. It was the lowest on record at: Fresno, 52.8; Eureka, 48.8; and Baker City, 34.2.

The *maximum and minimum temperatures* of the current month are given in Table I. The highest maxima were: Los Angeles (18th), 94; Key West (10th), Yuma (19th), San Diego (15th), Red Bluff (6th), 85; Jacksonville (9th), Tampa (8th), 84. The lowest maxima were: St. Vincent (17th), 48; Idaho Falls (2d), Baker City (1st), Spokane (19th), Tatoosh Island (15th), 56; Santa Fe (21st), 57. The highest minima were: Key West (21st), 63; Jupiter (21st), 48; Port Eads (26th), 45; Tampa (21st), San Francisco (26th), 42. The lowest minima were: St. Vincent (29th), —16; Williston (8th), —14; Moorhead (22d), Lander (24th), —12; Bismarck (22d), —11.

The limit of freezing weather is shown on Chart VI by the isotherm of minimum 32, and the limit of frost by the isotherm of minimum 40.

The years of highest maximum and lowest minimum temperatures for November are given in the last four columns of Table I. During the current month the maximum temperatures were the highest on record at: Portland, Me., 69; Nantucket, 66; Albany, 70; Harrisburg, 75; Port Huron, 69; Green Bay, 68; Columbus, Ohio, 77; Parkersburg, 78; Norfolk, 80; Columbia, S. C., 83; Cincinnati, 78; Lexington, 78; Louisville, 79; Tatoosh Island, 62; Eureka, 74; San Francisco, 83. The minimum temperatures were the lowest on record at: Eureka, 32; Fresno, 29; San Diego, 38.

The greatest daily range of temperature and the extreme monthly ranges are given for each of the regular Weather Bureau stations in Table 1, which also gives data from which may be computed the extreme monthly ranges for each station. The largest values of the greatest daily ranges were: Pueblo, 56; Winnemucca and San Luis Obispo, 48; Carson City, 47; Bismarck, Sioux City, and North Platte, 46; Amarillo and Fort Smith, 45; Dodge City, 44. The smallest values were: Key West, Tatoosh Island, and Fort Canby, 14; Astoria, 16; Galveston and Seattle, 17; Nantucket, Hatteras, East Clallam, and Port Angeles, 18; Charleston and Port Eads, 19. Among the extreme monthly ranges the largest values were: Lander, 78; North Platte, 77; Bismarck, 75; Williston, Huron, and Pueblo, 74; Moorhead and Denver, 73. The smallest values were: Fort Canby, 21; Key West, 22; Tatoosh Island, 23; Astoria, 24; Olympia, 29; Port Eads and Port Angeles, 31.

The *accumulated monthly departures* from normal temperatures from January 1 to the end of the current month are given in the second column of the following table, and the average departures are given in the third column, for comparison with the departures of current conditions of vegetation from the normal conditions.

Districts.	Accumulated departures.		Districts.	Accumulated departures.	
	Total.	Average.		Total.	Average.
	°	°		°	°
New England	+ 2.2	+ 0.2	Middle Atlantic	— 8.8	— 0.8
North Dakota	+ 0.2	0.0	South Atlantic	—16.5	— 1.5
Missouri Valley	+ 0.9	+ 0.1	Florida Peninsula	—13.5	— 1.2
Northern Plateau	+ 2.4	+ 0.2	East Gulf	—18.1	— 1.6
			West Gulf	—19.9	— 1.8
			Ohio Valley and Tenn.	—13.4	— 1.2
			Lower Lake	— 7.8	— 0.7
			Upper Lake	— 1.0	— 0.1
			Upper Mississippi	— 3.0	— 0.3
			Northern Slope	—12.0	— 1.1
			Middle Slope	— 6.0	— 0.5
			Abilene (southern Slope)	—21.6	— 2.0
			Southern Plateau	— 8.2	— 0.7
			Middle Plateau	—13.4	— 1.1
			North Pacific	— 3.7	— 0.3
			Middle Pacific	— 6.5	— 0.6
			South Pacific	— 8.7	— 0.8

MOISTURE.

The *quantity of moisture* in the atmosphere at any time may be expressed by the weight contained in a cubic foot of air, or by the tension or pressure of the vapor, or by the temperature of the dew-point. The mean dew-points for each station of the Weather Bureau, as deduced from observations made at 8 a. m. and 8 p. m., daily, are given in Table I.

The *rate of evaporation* from a special surface of water on muslin at any moment determines the temperature of the wet-bulb thermometer, but a properly constructed evaporometer may be made to give the *quantity* of water evaporated from a similar surface during any interval of time. Such an evaporometer, therefore, would sum up or integrate the effect of those influences that determine the temperature as given by the wet bulb; from this quantity the *average humidity of the air* during any given interval of time may be deduced.

Sensible temperatures.—The sensation of temperature experienced by the human body and ordinarily attributed to the condition of the atmosphere depends not merely on the temperature of the air, but also on its dryness, on the velocity of the wind, and on the suddenness of atmospheric changes, all combined with the physiological condition of the observer. The condition of the atmosphere as to moisture is so important that it has, by exaggeration, been sometimes considered as a controlling feature and the temperature of the wet-bulb thermometer, when whirled in the shade, has been called the sensible temperature, although this is often but a partial index of the sensation of temperature. In order to present a monthly summary of the atmospheric conditions on which hygienic and physiological phenomena depend, the moisture must be fully considered, and therefore Table VIII has been prepared, showing the maximum, minimum, and mean readings of the wet-bulb thermometer at 8 a. m. and 8 p. m., seventy-fifth meridian time. A complete expression for the relation between atmospheric conditions and nervous sensations is under consideration, but has not yet been obtained.

PRECIPITATION.

[In inches and hundredths.]

The *distribution of precipitation* for the current month, as determined by reports from about 2,500 stations, is exhibited on Chart III. The numerical details are given in Tables I, II, and III. The precipitation was heaviest, 8.00 to 12.00, over a small portion of the coasts of Oregon and Washington.